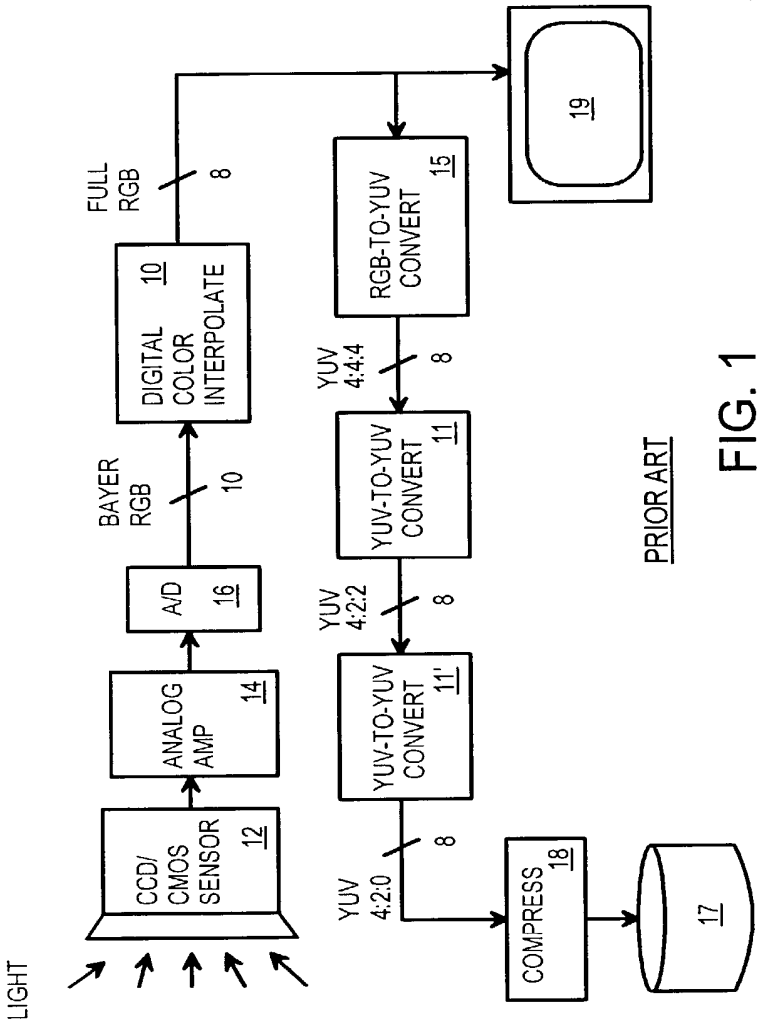


PRIOR ART

FIG. 1

PRIOR ART

FIG. 2

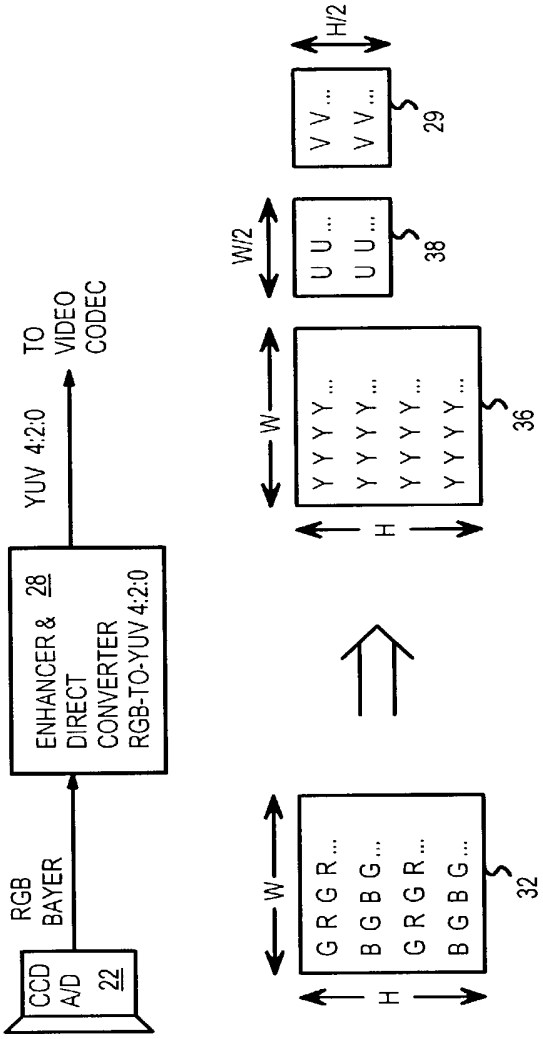

CCD A/D 22
RGB BAYER
ENHANCER & DIRECT CONVERTER RGB-TO-YUV 4:2:0 28
YUV 4:2:0
TO VIDEO CODEC
W
H
G R G R ...
B G B G ...
G R G R ...
B G B G ...
32
W
H
Y Y Y Y ...
Y Y Y Y ...
Y Y Y Y ...
Y Y Y Y ...
36
W/2
H/2
U U ...
U U ...
38
V V ...
V V ...
29

FIG. 3

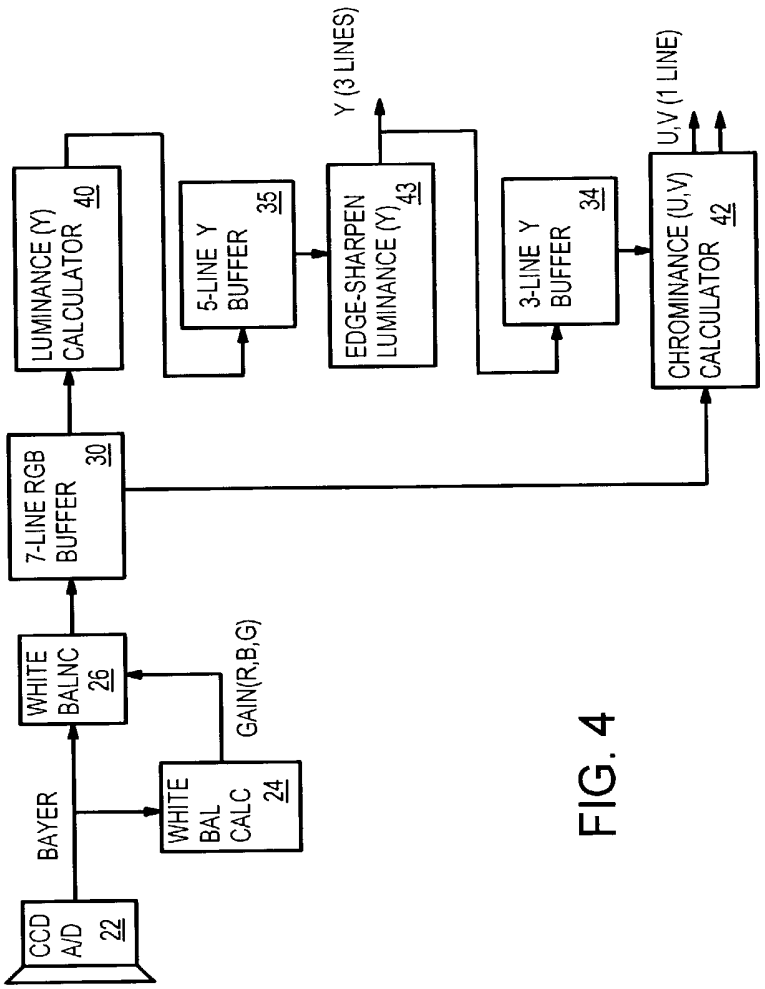
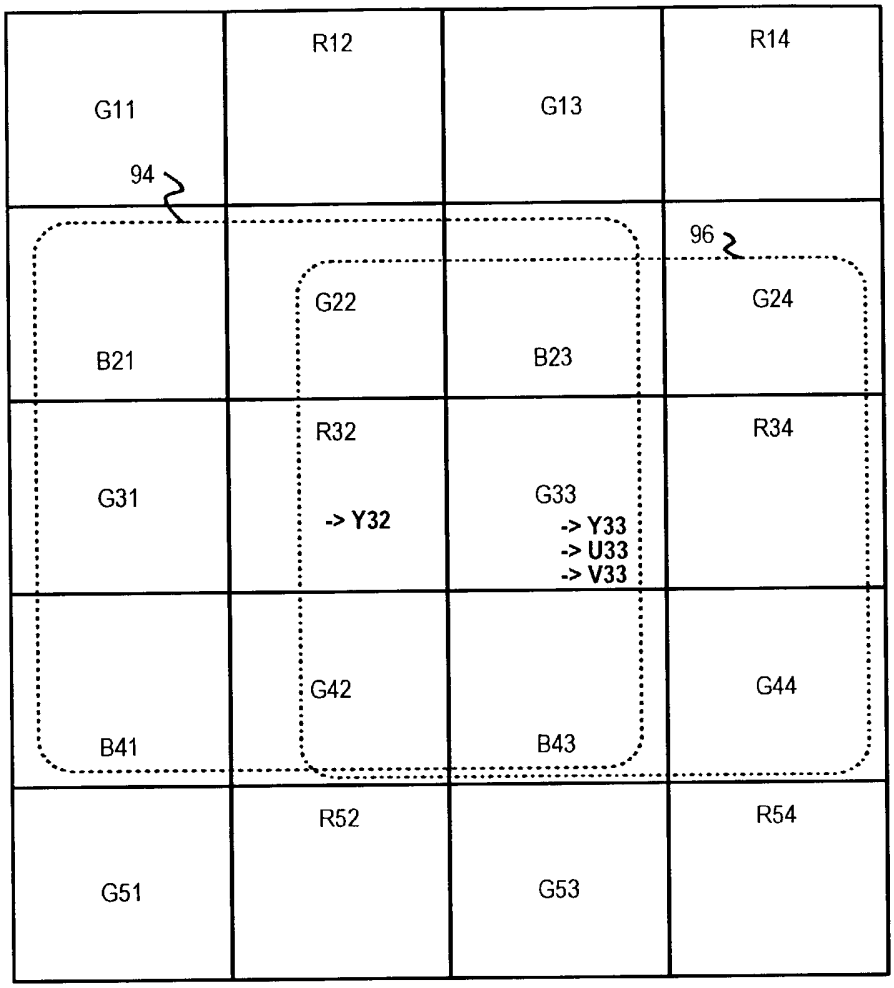

CCD A/D 22
BAYER
WHITE BAL CALC 24
GAIN(R,B,G)
WHITE BALNC 26
7-LINE RGB BUFFER 30
LUMINANCE (Y) CALCULATOR 40
5-LINE Y BUFFER 35
EDGE-SHARPEN LUMINANCE (Y) 43
Y (3 LINES)
3-LINE Y BUFFER 34
CHROMINANCE (U,V) CALCULATOR 42
U,V (1 LINE)

FIG. 4


R12
R14
G11
G13
94
96
G22
G24
B21
B23
R32
R34
G31
G33
-> Y32
-> Y33
-> U33
-> V33
G42
G44
B41
B43
R52
R54
G51
G53

30 FIG. 5

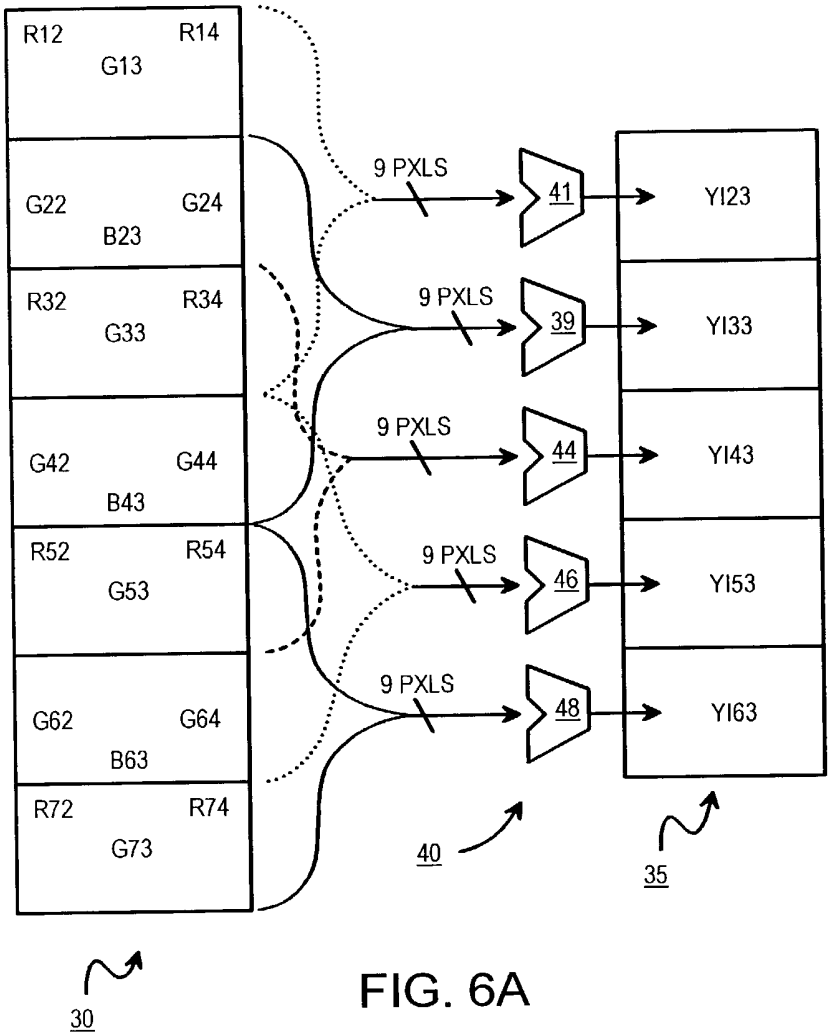

R12
R14
G13
G22
G24
B23
R32
R34
G33
G42
G44
B43
R52
R54
G53
G62
G64
B63
R72
R74
G73
9 PXLS
9 PXLS
9 PXLS
9 PXLS
9 PXLS
41
39
44
46
48
YI23
YI33
YI43
YI53
YI63
40
35
30

FIG. 6A

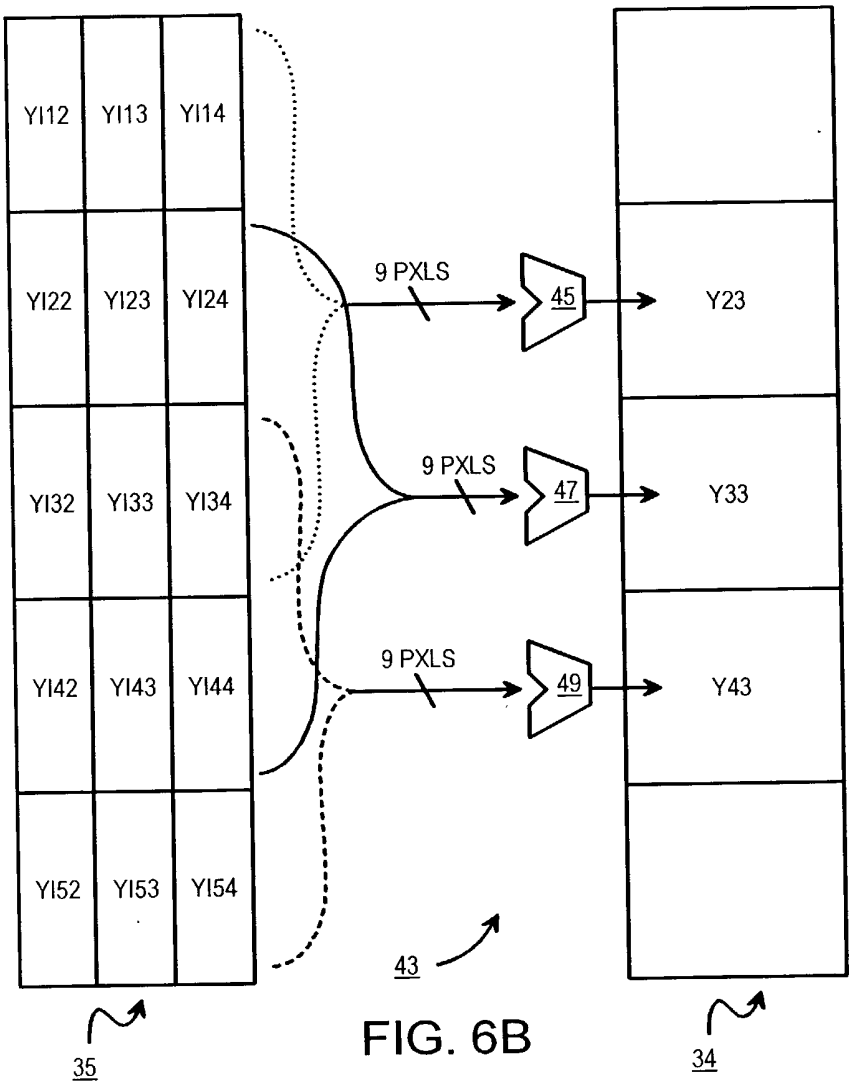

YI12
YI13
YI14
YI22
YI23
YI24
YI32
YI33
YI34
YI42
YI43
YI44
YI52
YI53
YI54
9 PXLS
45
9 PXLS
47
9 PXLS
49
Y23
Y33
Y43
43
35
34

FIG. 6B

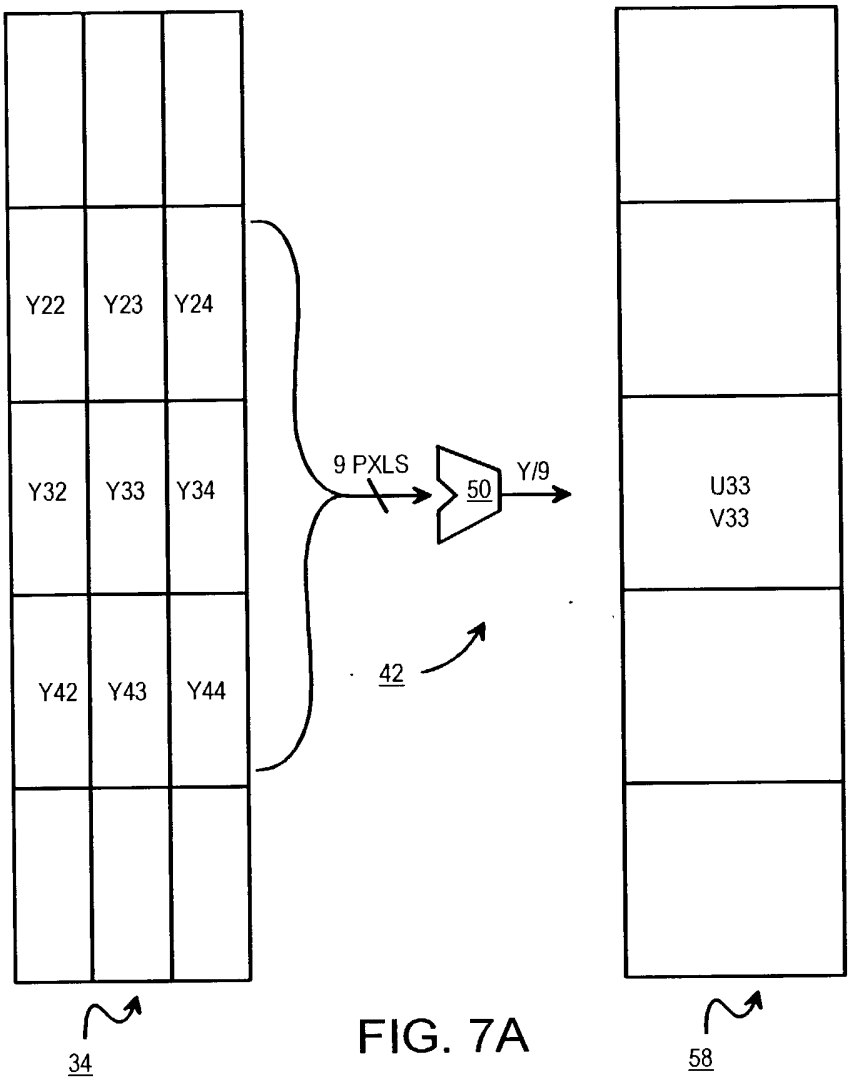


FIG. 7A

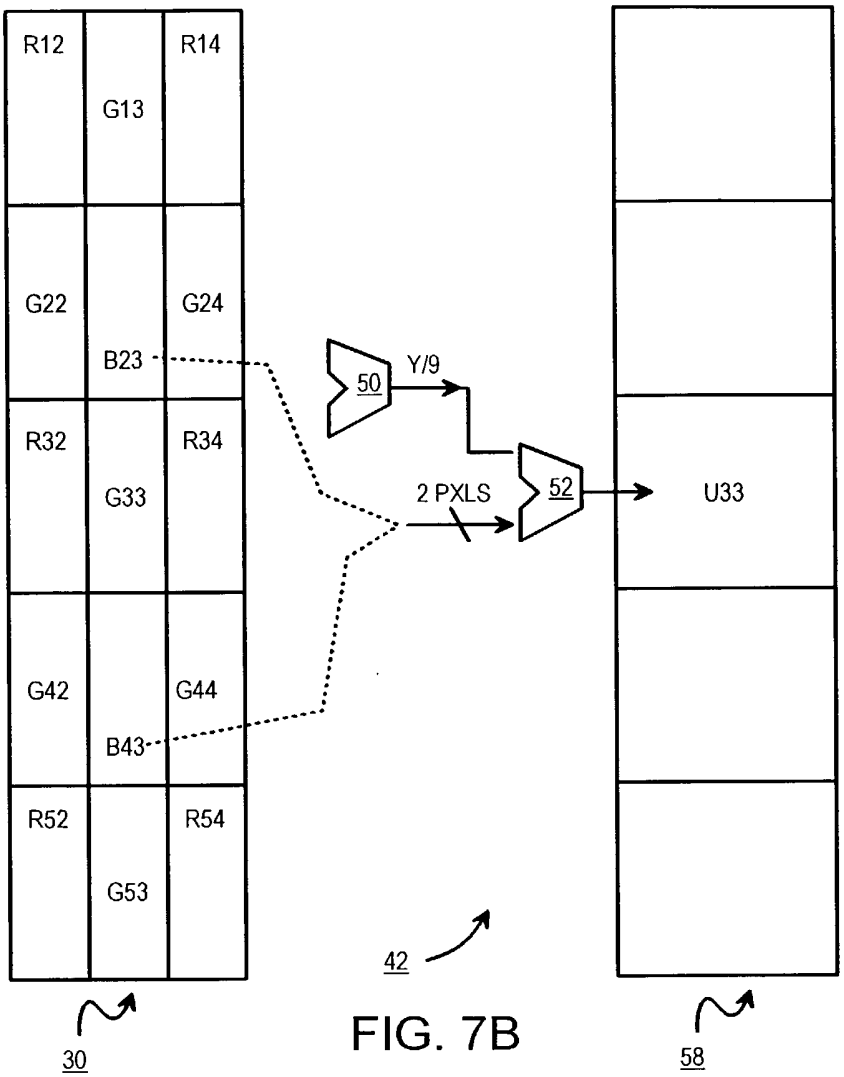

R12
G13
R14
G22
G24
B23
R32
G33
R34
G42
G44
B43
R52
G53
R54
50
Y/9
2 PXLS
52
U33
42
30
58

FIG. 7B

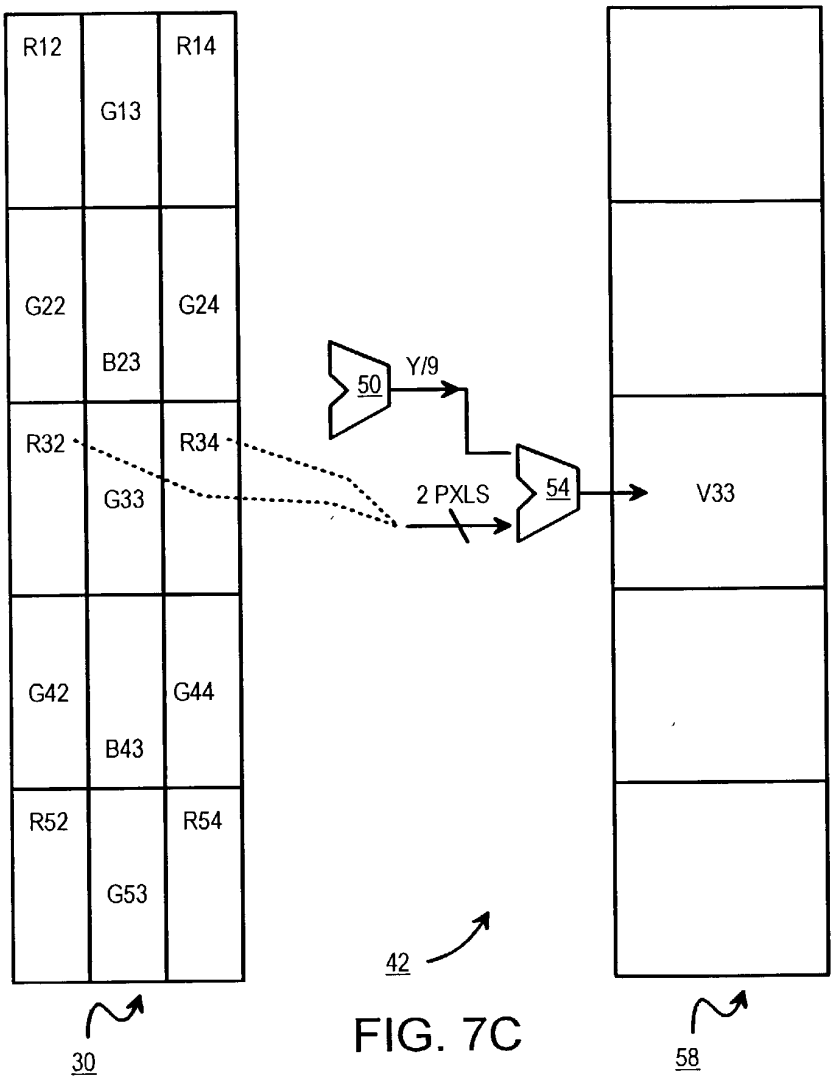

R12
G13
R14
G22
B23
G24
R32
G33
R34
G42
B43
G44
R52
G53
R54
50
Y/9
2 PXLS
54
V33
42
30
58

FIG. 7C

INITIAL LUMINANCE COMPUTATION (YI)

C = 0.299, D = 0.587, E = 0.144

G R G	R G R	B G B	G B G
B G B	G B G	G R G	R G R
G R G	R G R	B G B	G B G
PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4
D/8 C/2 D/8	C/4 D/4 C/4	E/4 D/4 E/4	D/8 E/2 D/8
E/2 D/2 E/2	D/4 E D/4	D/4 C D/4	C/2 D/2 C/2
D/8 C/2 D/8	C/4 D/4 C/4	E/4 D/4 E/4	D/8 E/2 D/8
COEFF FOR PATTERN 1	COEFF FOR PATTERN 2	COEFF FOR PATTERN 3	COEFF FOR PATTERN 4

FIG. 8A FIG. 8B FIG. 8C FIG. 8D

EDGE SHARPENING FOR LUMINANCE

YI	YI	YI
YI	YI	YI
YI	YI	YI

INITIAL Y PATTERN

FIG. 9A

-1/16	-2/16	-1/16
-2/16	12/16	-2/16
-1/16	-2/16	-1/16

COEFF FOR
EDGE SHARPENED Y

FIG. 9B

CHROMINANCE COMPUTATION

G B G
R G R
G B G

PATTERN 4

FIG. 10A

1/9 1/9 1/9
1/9 1/9 1/9
1/9 1/9 1/9

COEFF FOR INTERMEDIATE SUM (Y/9)

FIG. 10B

0 1/2 0
0 0 0
0 1/2 0

COEFF FOR INTERMEDIATE SUM (S_U)

FIG. 10C

0 0 0
1/2 0 1/2
0 0 0

COEFF FOR INTERMEDIATE SUM (S_V)

FIG. 10D

FIG. 10E

$$U = 0.493 \times (S_U - Y/9)$$

$$V = 0.877 \times (S_V - Y/9)$$

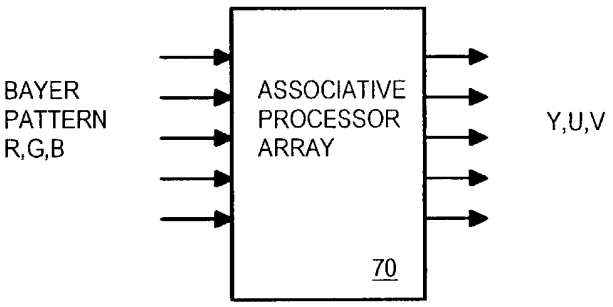


FIG. 11A

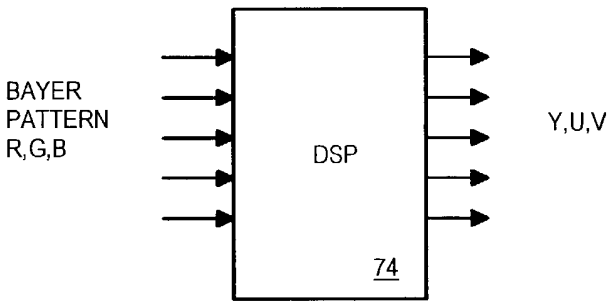


FIG. 11B

CHROMINANCE COMPUTATION FOR B-G-B PATTERN

B	G	B
G	R	G
B	G	B

PATTERN 3

FIG. 12A

1/9	1/9	1/9
1/9	1/9	1/9
1/9	1/9	1/9

COEFF FOR INTERMEDIATE SUM (Y/9)

FIG. 12B

1/4	0	1/4
0	0	0
1/4	0	1/4

COEFF FOR INTERMEDIATE SUM (S_U)

FIG. 12C

0	0	0
0	1	0
0	0	0

COEFF FOR INTERMEDIATE SUM (S_V)

FIG. 12D

FIG. 12E

$$U = 0.493 \times (S_U - Y/9)$$

$$V = 0.877 \times (S_V - Y/9)$$